

Interim Results of Santa Clara County Angler Survey: Summer, 2017

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1 Purpose

The Santa Clara County Angler Survey effort satisfies one of the ten “pollution prevention and reduction activities” required by Priority B1 of the Santa Clara Valley Water District’s *Safe, Clean Water and Natural Flood Protection Program* [5]. This document fulfills reporting requirements set forth in the 2017 *Santa Clara County Reservoir Angler Survey Plan* [6], which requires interim results of the survey to be presented in a memorandum by January of 2018. A more comprehensive final report will be published in January of 2019.

2 Background

Every two years, states are required to submit lists of impaired or threatened waters to the United States Environmental Protection Agency (USEPA). These waters are determined to have failed to meet water quality standards necessary to maintain one or more beneficial uses. The San Francisco Regional Water Quality Control Board (Regional Board) has identified eleven lakes and reservoirs owned and operated by the Santa Clara Valley Water District (District) as impaired for mercury in fish. The County of Santa Clara manages recreational activities, including fishing, at reservoirs open to the public. Methylmercury, the metal’s highly toxic organic form, bioaccumulates in fish tissue, potentially causing neurological damage and developmental defects in humans and birds that consume contaminated fish. Thus, mercury contamination in reservoirs presents substantial risks

to public health and ecological function. The California Office of Environmental Health Hazard Assessment (OEHHA) has issued fish consumption advisories for six of the eleven District reservoirs listed as impaired for mercury, as well as for Vasona Lake and Camden Ponds (Table 1).

Table 1: Santa Clara County Mercury-Impaired Reservoirs and OEHHA Fish Consumption Advisories

Water Body	Impaired for Hg on 303(d) List	OEHHA Consumption Advisory
Almaden Lake	X	
Almaden Reservoir	X	X
Anderson Reservoir	X	X
Calero Reservoir	X	X
Camden Ponds		X
Chesbro Reservoir	X	
Coyote Reservoir	X	
Guadalupe Reservoir	X	X
Lexington Reservoir	X	X
Ogier Ponds	X	
Stevens Creek Reservoir	X	X
Uvas Reservoir	X	
Vasona Lake		X

The USEPA designates an acceptable fish tissue methylmercury concentration of 0.3 mg/kg (wet weight) for adults who consume 17.5 grams of fish per day [2]. However, USEPA recognizes that fish consumption varies geographically and by angler, so therefore “fish consumption data are a necessary component of population exposure assessment” [1]. Agencies can use this information to take appropriate actions for the general population that protect the most vulnerable individuals, such as subsistence fishermen [1]. The State Water Resources Control Board (State Water Board) approved a new beneficial use and associated consumption criterion for subsistence fishing, aimed at minimizing risk to economically disadvantaged populations that rely on “the catching or gathering of aquatic resources to meet minimal needs for sustenance” [4].

The purpose of this study is multifaceted:

- Assessing fish consumption and human health risk in mercury-impaired reservoirs
- Assessing effectiveness of existing fish consumption advisories, informing future fish consumption advisories, and directing public outreach actions
- Assessing extent of subsistence fishing in impaired lakes and reservoirs

3 Survey Methodology

Survey methodology is based on USEPA’s “Guidance for Conducting Fish Consumption Surveys,” published in 2016 [3]. To ensure consistency and comparability with regional studies, survey questions were based on the Sierra Funds *Gold Country Angler Survey* [7]. The population of interest

for this survey is Santa Clara County anglers and fishermen that fish in mercury-impaired reservoirs.

In-person interviews were conducted at the eleven impaired water bodies, and two additional water bodies with OEHHA fish consumption advisories. Interviews gathered data related to fishing and consumption frequency, health hazard awareness, and sociodemographic information [6]. Plastic models of cooked fish fillet servings were used help anglers estimate portion sizes. Data was collected and georeferenced using a Trimble Kenai handheld tablet computer equipped with Survey123 software for Esri ArcGIS. Paper surveys were available in Spanish, Chinese, and Vietnamese for non-English speakers. Illiterate anglers, or anglers speaking other languages, were not interviewed. Spanish-speaking survey staff were used when available. All surveys were conducted by temporary or permanent District staff.

Interviewers conducted themselves in a friendly, non-regulatory manner to avoid non-response bias. Intensive sampling occurred throughout the fishing season from Spring to Fall of 2017, with surveys conducted at randomized locations, dates, and times of day. Sampling occurred on weekends as well as weekdays. Anglers that fished from the shore were interviewed at their location, while those that fished from boats were interviewed at launch sites. All anglers readily accessible at the lake or reservoir were interviewed. No anglers were interviewed twice throughout the course of the study. In instances where anglers fished in groups, only one member was interviewed. Upon completion of the interview, surveyors educated anglers about the risks of consuming fish from local water bodies, provided consumption advisories, and answered questions.

4 Results

In 2017, staff completed 252 surveys at the 13 water bodies (Figure 1). This effort was accomplished during 33 field-visits ranging from one to seven hours. 14 percent of anglers surveyed planned to eat their catch or give it to others (n=36). Of these, 20 percent were fishing in reservoirs with official OEHHA “Do Not Eat” advisories for all fish species (n=7)(Figure 2). Of those that planned to catch and release fish, 89 percent were aware of existing fish consumption advisories. However, of those intending to eat their catch or give it to others, only 45 percent were aware of advisories (Figure 3).

Ethnic Groups and Risk Awareness Of all anglers surveyed, 38 percent identified as white, 32 percent as Hispanic, and 25 percent as Asian or Pacific Islander. Hispanic anglers were 70 percent more likely than whites to ever consume fish from local lakes and reservoirs, and anglers who identified as Asian or Pacific Islander were 46 percent more likely (Figure 4). White anglers were approximately 23 percent more likely to be aware of existing consumption advisories than anglers that identified as Asian or Hispanic. 56 percent of those that knew about the consumption advisories learned of them through posted signage.

High-Risk Populations 66 percent of anglers that ever consume fish caught in local lakes and reservoirs have fed it to members of their household within the past year (n=29). Of these, 10 percent have fed fish to women that were pregnant or expecting (n=3), and 45 percent have fed their catch to children (n=13) in the past year. Hispanic anglers that fed fish to people in their

household were 2.3 times more likely than white anglers, and 1.6 times more likely than Asian anglers to have fed their catch to children in the past year.

Species Consumed and Preparation Largemouth bass were the most commonly-consumed fish species caught from local lakes and reservoirs, comprising 37 percent of species consumed (Figure 7). Channel catfish were consumed slightly less frequently, accounting for 26 percent of species consumed, and bluegill accounted for 12 percent of species consumed. 52 percent of those that ever consume fish caught from local lakes and reservoirs fry or deep fry it. 32 percent boil it or use it in soup.

Subsistence Fishing We suggest that anglers who consume locally caught fish at least monthly may rely on it as a means of sustenance. Of anglers that ever eat fish from Santa Clara County lakes and reservoirs, 42 percent ate fish at least once in the past thirty days ($n=18$)(Figure 8). This group represents seven percent of all anglers interviewed. Most of these anglers consumed one to two meals, but two respondents consumed six and twelve meals of reservoir fish in the previous month.

5 Discussion and Interim Recommendations

Anglers that were aware of existing fish consumption advisories were much less likely to consume their catch, or feed it to others. White anglers were more likely than other ethnic groups to be aware of fishing advisories. Only 56 percent of those that knew about the existing fish advisories learned of them through posted signage. Existing signage includes only English, Spanish, and Vietnamese languages. Many of the respondents interviewed were native Chinese speakers. We recommend that signage be updated to include simplified Chinese. We also recommend additional outreach to minority communities. Many anglers, particularly low-income individuals, use unofficial park entrances to avoid parking and entrance fees. These entrances are not often marked with obvious signage, contributing to the lack of awareness of mercury contamination, and related health risks. We recommend that additional signage be posted at unofficial entrances.

Nearly half of those that fed fish to members of their household did so to children. Mercury exposure to children presents a high risk for developmental defects and neurological damage. 69 percent of respondents get health information that they trust from their doctor or health care provider. We recommend conducting outreach to local pediatricians, particularly those that accept Medicaid, to emphasize the dangers of ingesting contaminated fish.

Largemouth bass is the most common species consumed from local lakes and reservoirs. As the apex predator in most reservoir systems, these fish possess the highest mercury concentrations, and highest risk for consumption. Current District signage does not make the distinction between risks associated with consuming various species. We recommend that OEHHA signage, which contains species information, is posted visibly at all entrances of each impaired reservoir where certain species may be consumed safely (Figure 9). Fish are commonly prepared by boiling, or included in soups. While preparation method does not affect mercury exposure, anglers may be able to reduce exposure to Polychlorinated Biphenyls (PCBs) by removing skin and fat before consumption. This information should be included on signage at lakes and reservoirs that contain fish with elevated

PCB concentrations.

Outreach efforts should be coordinated between the District and the County of Santa Clara to ensure effective implementation. The Santa Clara Valley Urban Runoff Pollution Prevention Program has initiated outreach programs to reduce consumption of contaminated fish in the past, and may be leveraged to advise future outreach efforts.

6 Acknowledgments

This community-outreach effort is funded by the District’s *Safe, Clean Water and Natural Flood Protection Program*. We would like to thank Kurt Hassy of the District’s Software Services Unit for developing the Survey123 application used to interview anglers. We would also like to thank District interns Spencer Seale, Tiffany Chao, Elisabeth Wilkinson, and Jorge Luna for conducting field interviews.

References

- [1] United States Environmental Protection Agency. Guidance for assessing chemical contaminant data for use in fish advisories, 2000.
- [2] United States Environmental Protection Agency. Water quality criterion for the protection of human health: methylmercury, 2001.
- [3] United States Environmental Protection Agency. Guidance for conducting fish consumption surveys, 2016.
- [4] California State Water Resources Control Board. Proposed provisions for draft part 2 of the water quality control plan for inland surface waters, enclosed bays, and estuaries of californiatribal and subsistence fishing beneficial uses, 2016.
- [5] Santa Clara Valley Water District. Safe, clean water and natural flood protection program, 2012.
- [6] Santa Clara Valley Water District. Santa clara county angler survey plan, 2017.
- [7] Sierra Fund. Gold country angler survey, 2011.

7 Figures

Figure 1: 2017 Angler Survey Locations

The map shows Santa Clara County water bodies listed on the Clean Water Act 303(d) list as impaired for mercury, and water bodies subject to OEHHA consumption advisories. The number of surveys conducted in 2017 is labeled in pink.

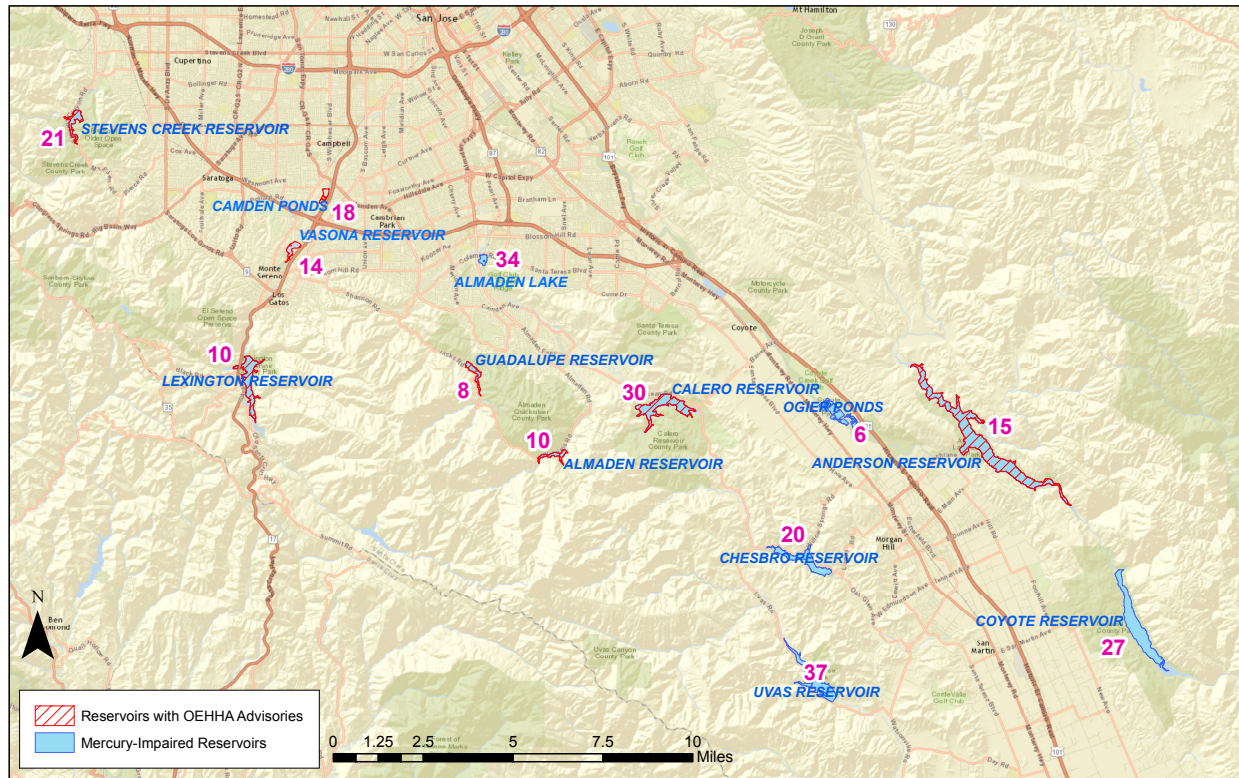


Figure 2: Purpose of Catch by Reservoir

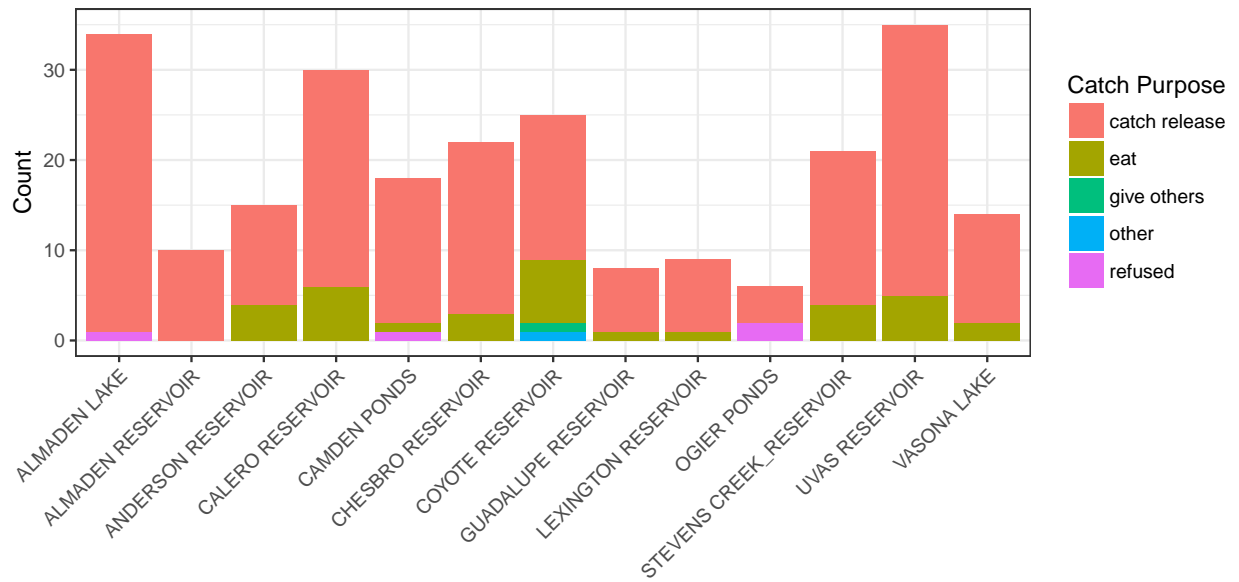


Figure 3: Advisory Awareness by Catch Purpose

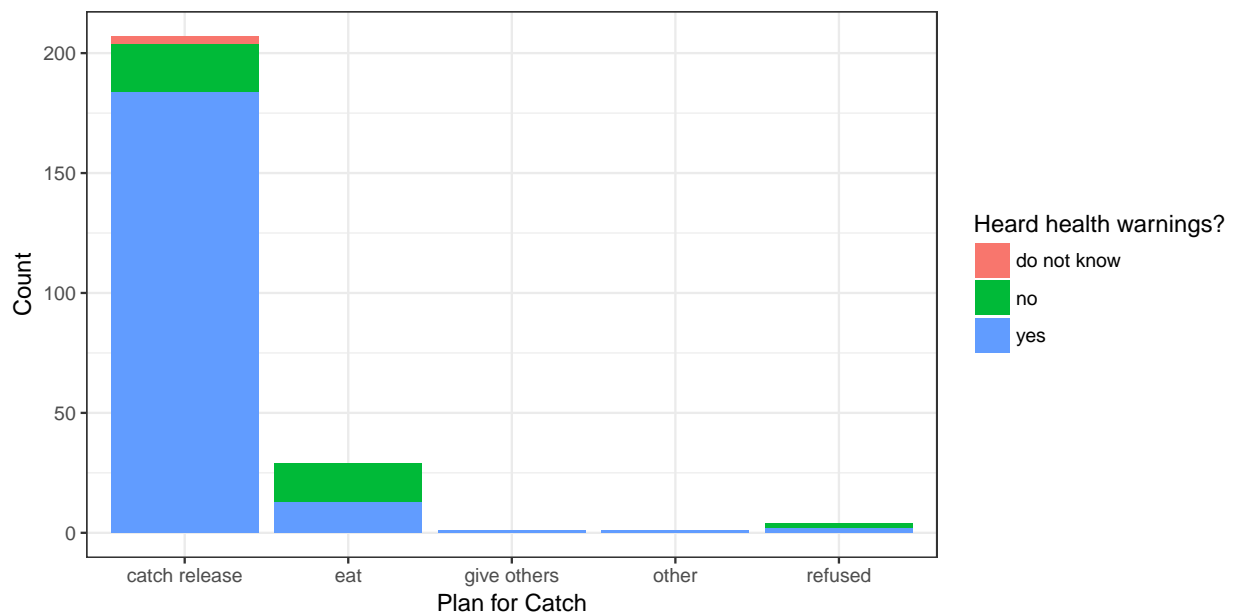


Figure 4: Fish Consumption by Ethnicity

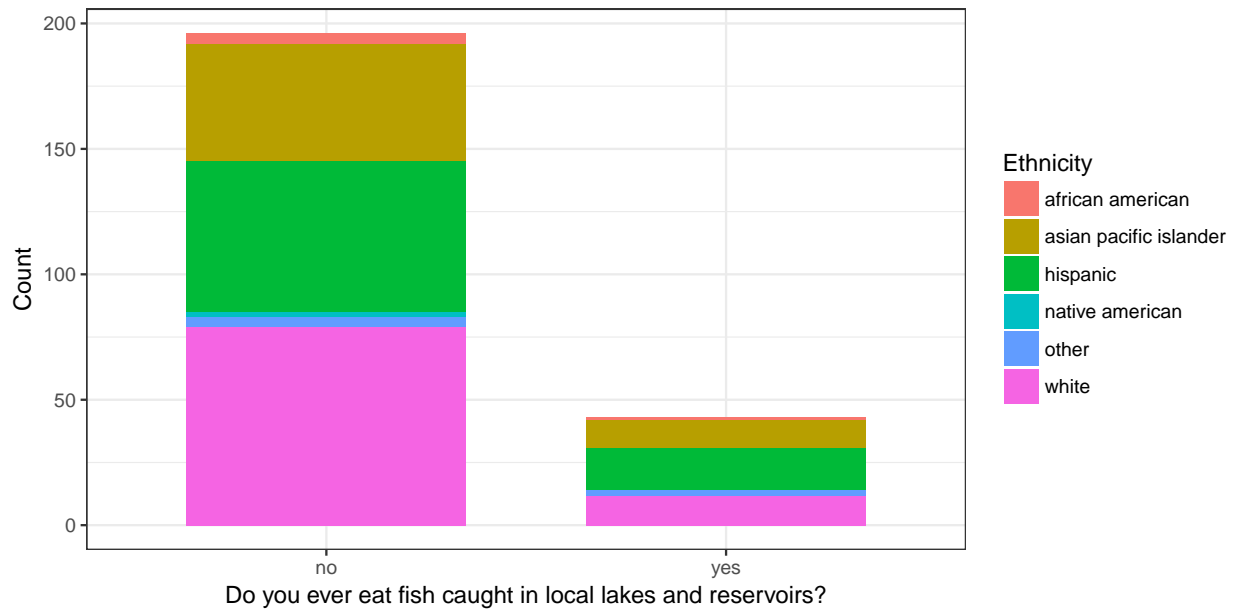


Figure 5: Fish Consumption by Pregnant or Expecting Women

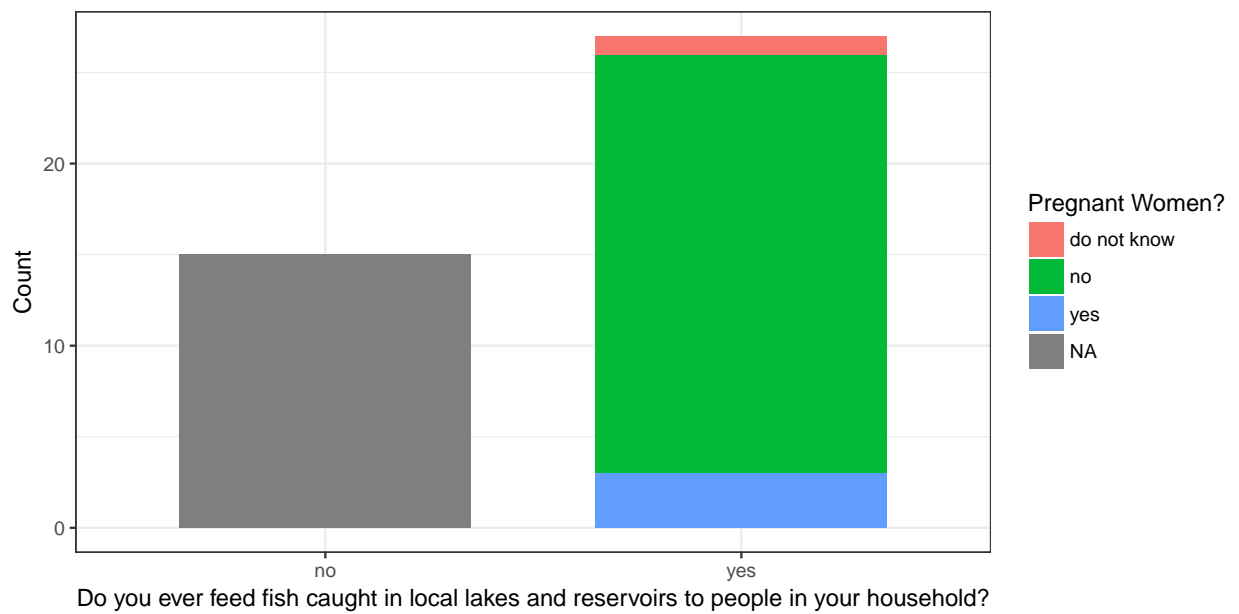


Figure 6: Fish Consumption by Children Under 18

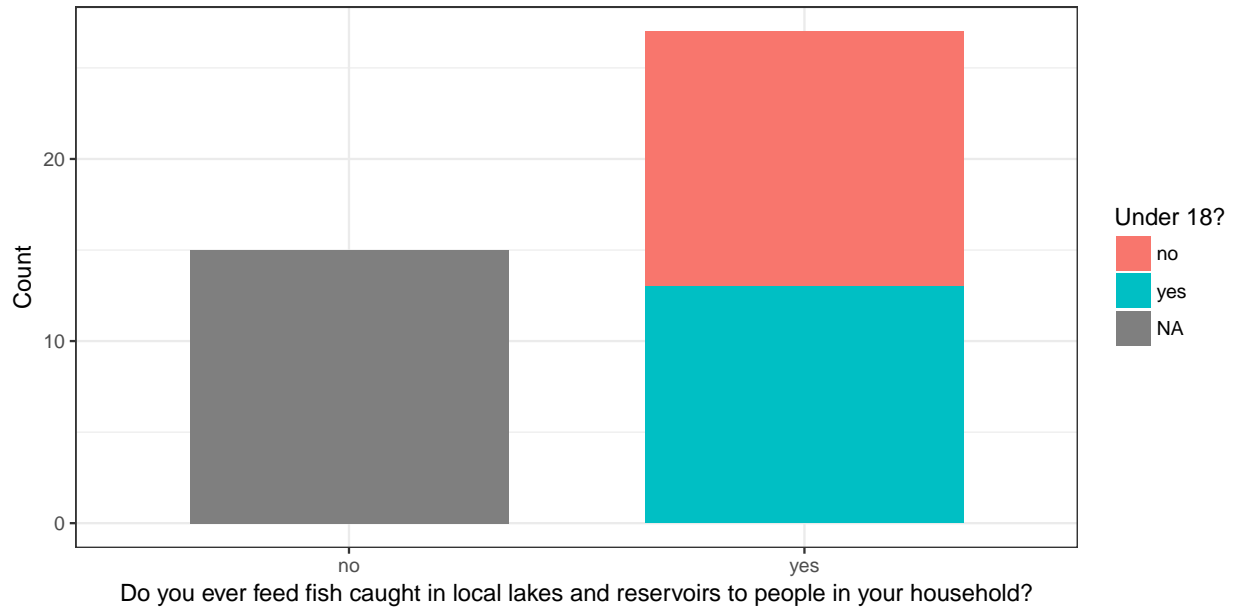


Figure 7: Fish Species Consumed in Santa Clara County Lakes and Reservoirs

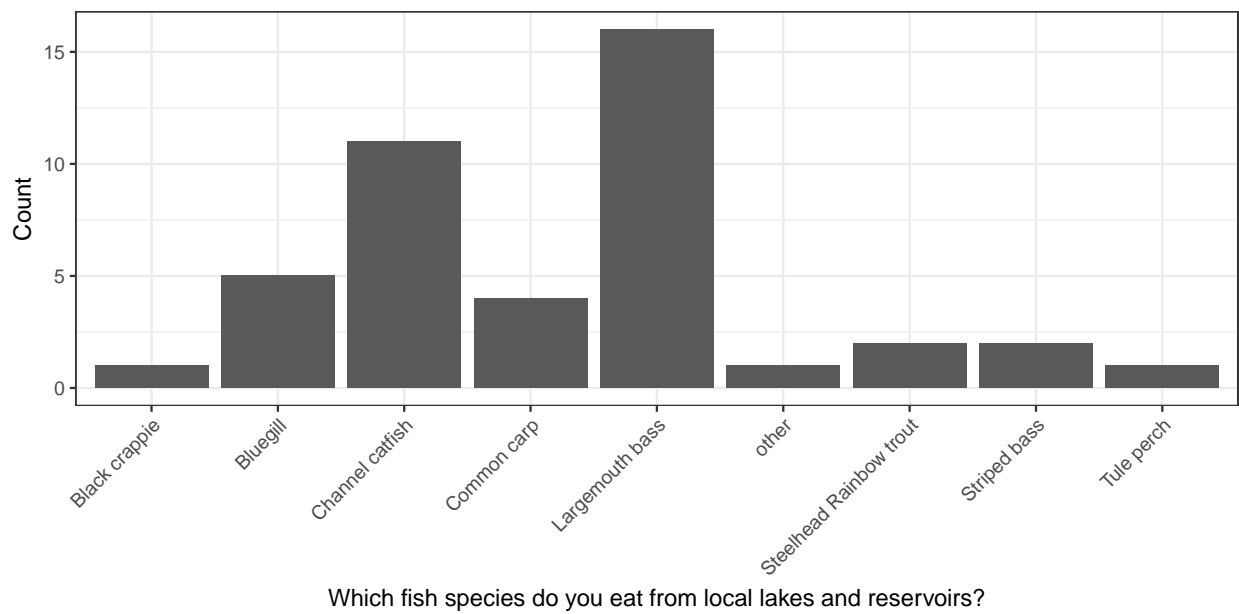


Figure 8: Frequency of Fish Consumption

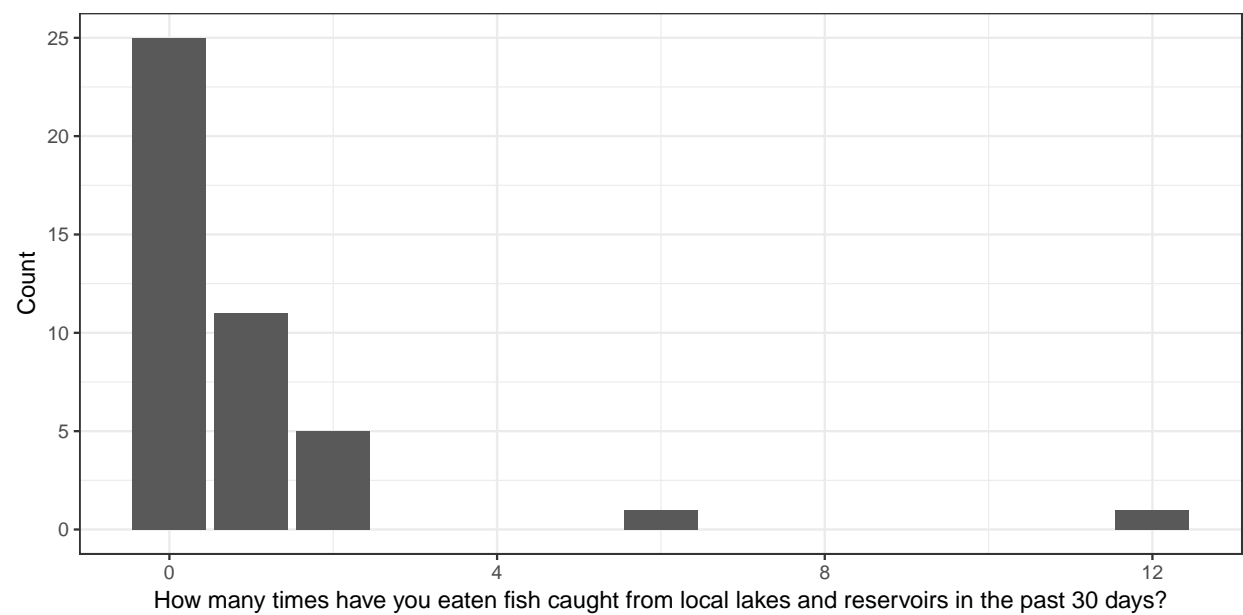


Figure 9: OEHHA Species-Specific Consumption Advisory

